ALICE: Physics Performance Report, Volume I

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Abstract

ALICE is a general-purpose heavy-ion experiment designed to study the physics of strongly interacting matter and the quark-gluon plasma in nucleus-nucleus collisions at the LHC. It currently includes more than 900 physicists and senior engineers, from both nuclear and high-energy physics, from about 80 institutions in 28 countries.

The experiment was approved in February 1997. The detailed design of the different detector systems has been laid down in a number of Technical Design Reports issued between mid-1998 and the end of 2001 and construction has started for most detectors.

Since the last comprehensive information on detector and physics performance was published in the ALICE Technical Proposal in 1996, the detector as well as simulation, reconstruction and analysis software have undergone significant development. The Physics Performance Report (PPR) [1] will give an updated and comprehensive summary of the current status and performance of the various ALICE subsystems, including updates to the Technical Design Reports, where appropriate, as well as a description of systems which have not been published in a Technical Design Report.

The PPR will be published in two volumes. The current Volume I contains:
1. a short theoretical overview [2] and an extensive reference list concerning the physics topics of interest to ALICE,
2. relevant experimental conditions at the LHC,
3. a short summary and update of the subsystem designs, and
4. a description of the offline framework and Monte Carlo generators.

Volume II, which will be published separately, will contain detailed simulations of combined detector performance, event reconstruction, and analysis of a representative sample of relevant physics observables from global event characteristics to hard processes.

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1. ALICE physics–theoretical overview

2. LHC experimental conditions

3. ALICE detector

4. Offline computing and Monte Carlo generators

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[1] F. Carminati, R. Vogt, et al., J. Phys. **G30**, 1517 (2004).
[2] B. Alessandro et al. (2002), ALICE Internal Note 2002-025, LBNL-52548.